

## COURS THEMATIQUES

*Au cours de l'automne 2018, une série de leçons sera organisée sur le thème*

### Stochastic quantisation of QFTs & applications to quantum gravity and early cosmology

**Laurent Baulieu – LPTHE UPMC**

Stochastic Quantisation is a universal method with a wide field of applications. These series of lectures aim at motivating its use for quantum gravity and early cosmology, and giving a thorough portrait of its present status. Their content is organised as follows:

- Challenges and proposals in early cosmology and quantum gravity.
- Langevin equation for the Brownian motion.
- Langevin equation for QFT Euclidean correlators (Parisi – Wu approach).
- Emergence of Minkowski time in stochastic quantisation.
- Link with Fokker–Planck formulation, properties of convergence of correlation functions at infinite stochastic time.
- More recent formulation using stochastic time, supersymmetry and path integral representation.
- Connection with topological quantum field theory.
- Treatment of gauge theories within the stochastic quantisation approach – examples with various local symmetries.
- Compatibility between space–time supersymmetry and stochastic supersymmetry.
- Properties of the correlation functions at finite values of the stochastic time, depending on the rank of the Langevin equation.

## CPHT – ECOLE POLYTECHNIQUE

### Fourth and fifth lectures Friday November 9 Stochastic quantisation and gauge fields 11:00 & 14:00 – salle Louis Michel – CPHT

**Plan:**

- The role of instantons in stochastic quantisation.
- Fermions in stochastic quantisation and the kernels for their Fokker–Planck evolution.
- Gauge theories in stochastic quantisation and their equivariant cohomology.
- Supersymmetric theories in stochastic quantisation and the fate of their auxiliary fields.
- What do we learn from the stochastic quantisation of gauge fields?

